CLAIMS

What is Claimed is:

Fig 6 1. An image processing device which by processing an image defined by a combination of unit graphic forms splits said unit graphic forms into multiple sub-unit graphic forms,

the image processing device comprising:

an interpolated line computation means for determining an interpolated line which is the line that interpolates a space between two vertices from an interpolation vector used for determining a line that interpolates a space between a given vertex and another vertex of vertices of said unit graphic forms and from coordinates of said vertices; and

an interpolated point computation means for determining as vertices of said sub-unit graphic forms, interpolated points which are points on said interpolated line.

2. The image processing device as described in claim 1 wherein:

Fig 15 if a unit graphic form has vertices 1 through 4, a line segment which joins vertices 1 and 2 of said vertices 1 through 4 and a line segment that joins vertices 3 and 4 of said vertices 1 through 4 lie opposite each other, and a line segment which joins said vertices 1 and 3 and a line segment that joins said vertices 2 and 4 lie opposite each other;

said interpolated line computation means determines an interpolated line 1 which interpolates a space between said vertices 1 and 2, an interpolated line 2 which interpolates said vertices 3 and 4, an interpolated line 3 which interpolates a space between said vertices 1 and 3, and an interpolated line 4 which interpolates said vertices 2 and 4, and also determines an interpolated line 5 which interpolates a space between an interpolated point on said interpolated line 1 and an interpolated point on said interpolated line 2; and

said interpolated point computation means determines interpolated points on said interpolated lines 1 through 5 as vertices of said sub-unit graphic forms.

3. The image processing device as described in claim 2, and further comprising:

an interpolation vector computation means for determining said interpolation vectors at interpolated points on said interpolated line 1 from said interpolation vectors at said vertices 1

and 2 and determining said interpolation vectors at interpolated points on said interpolated line 2 from said interpolation vectors at said vertices 3 and 4; wherein

said interpolated line computation means determines said interpolated line 5 from said interpolation vectors at interpolated points on said interpolated lines 1 and 2 and from coordinates of the interpolated points.

4. The image processing device as described in claim 3, wherein

said interpolation vectors at vertices 1 through 4 of said unit graphic forms are normal-direction normal vectors of a shape to be produced by said unit graphic forms.

5. The image processing device as described in claim 3, wherein

said interpolation vectors at vertices 1 through 4 of said unit graphic forms are vectors which define a direction at said vertices 1 through 4 of each said interpolated line which passes through said vertex 1 through 4, respectively.

6. The image processing device as described in claim 4, wherein

said interpolation vectors at vertices 1 through 4 of said unit graphic forms further include, in addition to said normal vectors, interpolated line direction vectors which define a direction at said vertices 1 through 4 of each said interpolated line which passes through said vertex 1 through 4, respectively.

7. The image processing device as described in claim 6, wherein

said interpolated line computation means determines said interpolated lines 1 through 4 using said interpolated line direction vectors, and

said interpolation vector computation means determines said interpolation vectors at interpolated points on said interpolated lines 1 and 2 using said normal vectors.

8. The image processing device as described in claim 2, wherein

any one set of vertices among said vertices 1 and 2, said vertices 3 and 4, said vertices 1 and 3, or said vertices 2 and 4 is the same set of vertices.

Fig 6 9. The image processing device as described in claim 1, wherein

said interpolation vectors at vertices of said unit graphic forms are normal-direction

normal vectors of a shape to be produced by said unit graphic forms.

10. The image processing device as described in claim 9, wherein

said interpolation vectors at the vertices of said unit graphic forms further include, in addition to said normal vectors, vectors which define a direction of said interpolated lines at said vertices.

11. The image processing device as described in claim 1,

said interpolation vectors at the vertices of said unit graphic forms are interpolated line direction vectors which define directions of said interpolated lines at said vertices.

12. The image processing device as described in claim 11, wherein

if said interpolated line is touched by a line onto which is projected a line segment which joins said vertex and another vertex in a prescribed plane which includes said vertex, said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

13. The image processing device as described in claim 11 wherein

said interpolated line direction vectors are vectors which define a tangent direction of said interpolated lines at said vertices.

14. The image processing device as described in claim 1 and further comprising:

an interpolation vector computation means for determining from interpolation vectors at said vertices, an interpolation vector to be used for determining the line which interpolates the space between a given interpolated point and another interpolated point of said interpolated points.

15. The image processing device as described in claim 14, wherein

when a ratio of values corresponding to a distance from said interpolated point between one vertex and another vertex to one of said one vertex and the other vertex, respectively, is denoted by t:1-t,

said interpolation vector computation means determines as the interpolation vector at said interpolated point the result corresponding to the sum of (1-t) times the interpolation vector at said one vertex plus t times the interpolation vector at said other vertex.

16. The image processing device as described in claim 15, and further comprising:

a correction means for correcting the interpolation vector at said interpolated point determined by said interpolation vector computation means.

17. The image processing device as described in claim 16, wherein said correction means determines the vector product of the interpolation vector at said interpolated point determined by said interpolation vector computation means and a tangent-direction tangent vector of said interpolated line at said interpolated point, determines the vector product of said vector product and said tangent vector, and takes a resulting vector as a post-correction interpolation vector at said interpolated point.

18. The image processing device as described in claim 17, wherein said image is a three-dimensional image, and the image processing device further comprises a rendering means for rendering said sub-unit graphic forms.

19. The image processing device as described in claim 18, wherein said rendering means performs shading based on said post-correction interpolation vector.

20. The image processing device as described in claim 11, wherein said interpolated line is a Bezier curve.

21. The image processing device as described in claim 20, wherein:

said image is a three-dimensional image; and

said interpolated line computation means includes:

an angle computation means for determining an angle 1 or 2 formed by a straight line which joins one vertex and another vertex interpolated by said interpolated line, which is said Bezier curve, and each projection of the straight line onto a plane perpendicular to the interpolation vector at said one vertex or other vertex, which is a plane that includes said one vertex or other vertex,

a distance computation means for determining, based on said angles 1 and 2, a control edge length 1 or 2, which is a distance from said one vertex or other vertex to a control point 1 or 2 of said Bezier curve, and

a Bezier curve computation means for determining said Bezier curve as the interpolated line which interpolates the space between said one vertex and other vertex by determining, based on said control edge length 1 or 2, each said control point 1 and 2.

22. The image processing device as described in claim 1, wherein

if the coordinates of the vertices of said unit graphic forms and the interpolation vectors are recorded on a recording medium, the image processing device further comprises a playback means for playing back from the recording medium the coordinates of said vertices and the interpolation vectors.

23. The image processing device as described in claim 1, wherein

if the coordinates of the vertices of said unit graphic forms and the interpolation vectors are transmitted via a transmission route, the image processing device further comprises a reception means for receiving the coordinates of said vertices and the interpolation vectors transmitted via the transmission route.

24. The image processing device as described in claim 1, wherein

said image is a three-dimensional image, and the image processing device

further comprising:

an operation means which is operated when a prescribed input is given;

a geometry processing means for reading data concerning said unit graphic forms from a recording medium and performing with respect to the data, geometry processing that corresponds to input from said operation means,

a conversion means for converting said sub-unit graphic forms obtained by splitting said unit graphic forms resulting after said geometry processing into ones in the coordinate system of a

two-dimensional output device, and

a rendering means for rendering said sub-unit graphic forms converted by said conversion means.

25. An image processing method for an image processing device which by processing an

image defined by a combination of unit graphic forms, splits said unit graphic forms into multiple sub-unit graphic forms,

the image processing method comprising:

an interpolated line computation step of determining an interpolated line which is a line that interpolates a space between two vertices from an interpolation vector used for determining a line that interpolates a space between a given vertex and another vertex of vertices of said unit graphic forms and from coordinates of said vertices; and

an interpolated point computation step of determining, as the vertices of said sub-unit graphic forms, interpolated points which are points on said interpolated line.

See Fig. 15

26. The image processing method as described in claim 25, wherein

if a unit graphic form has vertices 1 through 4, a line segment which joins vertices 1 and 2 of said vertices 1 through 4 and a line segment that joins vertices 3 and 4 of said vertices 1 through 4 lie opposite each other, and a line segment that joins said vertices 1 and 3 and a line segment that joins said vertices 2 and 4 lie opposite each other,

said interpolated line computation step determines an interpolated line 1 that interpolates a space between said vertices 1 and 2, an interpolated line 2 that interpolates said vertices 3 and 4, an interpolated line 3 that interpolates the space between said vertices 1 and 3, and an interpolated line 4 that interpolates said vertices 2 and 4, and also determines an interpolated line 5 that interpolates a space between an interpolated point on said interpolated line 1 and an interpolated point on said interpolated line 2, and

said interpolated point computation step determines the interpolated points on said interpolated lines 1 through 5 as vertices of said sub-unit graphic forms.

27. The image processing method as described in claim 26 and further comprising:

an interpolation vector computation step of determining said interpolation vector at interpolated points on said interpolated line 1 from said interpolation vector at said vertices 1 and 2 and determining said interpolation vector at interpolated points on said interpolated line 2 from said interpolation vector at said vertices 3 and 4, and wherein

said interpolated line computation step determines said interpolated line 5 from said interpolation vector at interpolated points on said interpolated lines 1 and 2 and from coordinates of the interpolated points.

28. The image processing method as described in claim 27, wherein:

said interpolation vectors at vertices 1 through 4 of said unit graphic forms are normal-direction normal vectors of a shape to be produced by said unit graphic forms.

29. The image processing method as described in claim 27, wherein:

said interpolation vectors at vertices 1 through 4 of said unit graphic forms are vectors which define the direction at said vertices 1 through 4 of each said interpolated line which passes through said vertices 1 through 4, respectively.

30. The image processing method as described in claim 28, wherein:

said interpolation vectors at vertices 1 through 4 of said unit graphic forms further include, in addition to said normal vectors, interpolated line direction vectors which define a direction at said vertices 1 through 4 of each said interpolated line that passes through said vertices 1 through 4, respectively.

31. The image processing method as described in claim 30, wherein:

said interpolated line computation step determines said interpolated lines 1 through 4 using said interpolated line direction vectors, and

said interpolation vector computation step determines said interpolation vectors at interpolated points on said interpolated lines 1 and 2 using said normal vectors.

32. The image processing method as described in claim 26, wherein:

any one set of vertices among said vertices 1 and 2, said vertices 3 and 4, said vertices 1 and 3, or said vertices 2 and 4 are the same vertices.

33. The image processing method as described in claim 25, wherein:

said interpolation vectors at vertices of said unit graphic forms are normal-direction normal vectors of the shape to be realized by said unit graphic forms.

34. The image processing method as described in claim 33, wherein:

said interpolation vectors at the vertices of said unit graphic forms further include, in addition to said normal vectors, vectors which define directions of said interpolated lines at said vertices.

35. The image processing method as described in claim 25, wherein:

said interpolation vectors at the vertices of said unit graphic forms are interpolated line direction vectors which define directions of said interpolated lines at said vertices.

36. The image processing method as described in claim 35, wherein

if, in a prescribed plane that includes said vertices, said interpolated line is touched by a line onto which is projected a line segment that joins a given vertex and another vertex, said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

37. The image processing method as described in claim 35, wherein

said interpolated line direction vectors are vectors that express the tangent direction of said interpolated lines at said vertices.

38. The image processing method as described in claim 25, and further comprising:

an interpolation vector computation step of determining, from interpolation vectors at said vertices, the interpolation vector to be used for determining a line that interpolates the space between a given interpolated point and another interpolated point in said interpolated points.

39. The image processing method as described in claim 38, wherein

when the ratio of values corresponding to a distance from said interpolated point between one vertex and another vertex to said one vertex or to the other vertex, respectively, is denoted by t:1-t,

said interpolation vector computation step determines as the interpolation vector at said interpolated point a result corresponding to the sum of (1-t) times the interpolation vector at said one vertex plus t times the interpolation vector at said other vertex.

40. The image processing method as described in claim 39, and further comprising:

a correction step of correcting the interpolation vector at said interpolated point determined by said interpolation vector computation step.

41. The image processing method as described in claim 40, wherein

said correction step

determines a vector product of the interpolation vector at said interpolated point determined by said interpolation vector computation step and a tangent-direction tangent vector of said interpolated line at said interpolated point,

determines the vector product of said vector product and said tangent vector, and

takes the resulting vector as a post-correction interpolation vector at said interpolated point.

42. The image processing method as described in claim 41, wherein

said image is a three-dimensional image, and further comprising

a rendering step of rendering said sub-unit graphic forms.

43. The image processing method as described in claim 42, wherein

said rendering step performs shading based on said post-correction interpolation vector.

44. The image processing method as described in claim 25, wherein

said interpolated line is a Bezier curve.

45. The image processing method as described in claim 44, wherein

said image is a three-dimensional image, and wherein

said interpolated line computation step includes:

an angle computation step of determining an angle 1 or 2 formed by a straight line that joins one vertex and another vertex interpolated by said interpolated line, which is said Bezier curve, and each projection of the straight line onto a plane perpendicular to the interpolation vector at said one vertex or other vertex, which is a plane that includes said one vertex or other vertex,

a distance computation step of determining, based on said angles 1 and 2, a control edge length 1 or 2, which is the distance from said one vertex or other vertex to control point 1 or 2 of said Bezier curve, and

a Bezier curve computation step of determining said Bezier curve as the interpolated line

that interpolates the space between said one vertex and other vertex by determining, based on said control edge length 1 or 2, each said control point 1 and 2.

46. The image processing method as described in claim 25, wherein

if the coordinates of the vertices of said unit graphic forms and the interpolation vectors are recorded on a recording medium, the image processing method further comprises a playback step of playing back from the recording medium the coordinates of said vertices and the interpolation vectors.

47. The image processing method as described in claim 25, wherein

if the coordinates of the vertices of said unit graphic forms and the interpolation vectors are transmitted via a transmission route, the image processing method further comprises a reception step of receiving the coordinates of said vertices and the interpolation vectors transmitted via the transmission route.

48. The image processing method as described in claim 25, wherein

said image is a three-dimensional image, and

said image processing device includes an operation means which is operated when a prescribed input is given, and

the image processing method further comprising:

a geometry processing step of reading data concerning said unit graphic forms from a recording medium and performing with respect to the data, geometry processing that corresponds to input from said operation means,

a conversion step of converting said sub-unit graphic forms obtained by splitting said unit graphic forms resulting after said geometry processing into ones in the coordinate system of a two-dimensional output device, and

a rendering step of rendering said sub-unit graphic forms converted by said conversion step.

49. A program distribution medium for providing a computer program to cause a computer to do processing that, by processing an image defined by a combination of unit graphic forms, splits

said unit graphic forms into multiple sub-unit graphic forms,

said computer program comprising:

an interpolated line computation step that determines the interpolated line that is the line that interpolates a space between two vertices from an interpolation vector used for determining the line that interpolates a space between a given vertex and another vertex of the vertices of said unit graphic forms and from coordinates of said vertices, and

an interpolated point computation step that determines, as the vertices of said sub-unit graphic forms, interpolated points that are points on said interpolated line.

50. The program distribution medium as described in claim 49, wherein

if a unit graphic form has vertices 1 through 4, a line segment which joins vertices 1 and 2 of said vertices 1 through 4 and a line segment that joins vertices 3 and 4 of said vertices 1 through 4 lie opposite each other, and a line segment that joins said vertices 1 and 3 and the line segment that joins said vertices 2 and 4 lie opposite each other,

said interpolated line computation step determines an interpolated line 1 that interpolates a space between said vertices 1 and 2, an interpolated line 2 that interpolates said vertices 3 and 4, an interpolated line 3 that interpolates a space between said vertices 1 and 3, and an interpolated line 4 that interpolates said vertices 2 and 4, and also determines an interpolated line 5 that interpolates a space between an interpolated point on said interpolated line 1 and an interpolated point on said interpolated line 2, and

said interpolated point computation step determines the interpolated points on said interpolated lines 1 through 5 as vertices of said sub-unit graphic forms.

51. The program distribution medium as described in claim 50, wherein

said computer program further comprises an interpolation vector computation step that determines said interpolation vector at interpolated points on said interpolated line 1 from said interpolation vector at said vertices 1 and 2 and determines said interpolation vector at interpolated points on said interpolated line 2 from said interpolation vector at said vertices 3 and 4, and

said interpolated line computation step determines said interpolated line 5 from said interpolation vector at interpolated points on said interpolated lines 1 and 2 and from the coordinates of the interpolated points.

52. The program distribution medium as described in claim 51, wherein

said interpolation vectors at vertices 1 through 4 of said unit graphic forms are normal-direction normal vectors of the shape to be realized by said unit graphic forms.

53. The program distribution medium as described in claim 51, wherein

said interpolation vectors at vertices 1 through 4 of said unit graphic forms are vectors which define the direction at said vertices 1 through 4 of each said interpolated line that passes through said vertices 1 through 4, respectively.

54. The program distribution medium as described in claim 52, wherein

said interpolation vectors at vertices 1 through 4 of said unit graphic forms further include, in addition to said normal vectors, interpolated line direction vectors which define a direction at said vertices 1 through 4 of each said interpolated line that passes through said vertices 1 through 4, respectively.

55. The program distribution medium as described in claim 54, wherein

said interpolated line computation step determines said interpolated lines 1 through 4 using said interpolated line direction vectors, and

said interpolation vector computation step determines said interpolation vectors at interpolated points on said interpolated lines 1 and 2 using said normal vectors.

56. The program distribution medium as described in claim 50, wherein

any one set of vertices among said vertices 1 and 2, said vertices 3 and 4, said vertices 1 and 3, or said vertices 2 and 4 are the same vertices.

57. The program distribution medium as described in claim 49, wherein

said interpolation vectors at vertices of said unit graphic forms are normal-direction normal vectors of the shape to be produced by said unit graphic forms.

58. The program distribution medium as described in claim 57, wherein

said interpolation vectors at the vertices of said unit graphic forms further include, in addition to said normal vectors, vectors which define a direction of said interpolated lines at said vertices.

59. The program distribution medium as described in claim 49, wherein

said interpolation vectors at the vertices of said unit graphic forms are interpolated line direction vectors which define a direction of said interpolated lines at said vertices.

60. The program distribution medium as described in claim 59, wherein

if, in a prescribed plane that includes said vertices, said interpolated line is touched by a line onto which is projected a line segment which joins a given vertex and another vertex, said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

61. The program distribution medium as described in claim 59, wherein

said interpolated line direction vectors are vectors which define a tangent direction of said interpolated lines at said vertices.

62. The program distribution medium as described in claim 49, wherein

said computer program further includes an interpolation vector computation step that determines, from interpolation vectors at said vertices, the interpolation vector to be used for determining the line that interpolates the space between a given interpolated point and another interpolated point in said interpolated points.

63. The program distribution medium as described in claim 62, wherein

when a ratio of the values corresponding to a distance from said interpolated point between one vertex and another vertex to said one vertex or to the other vertex, respectively, is denoted by t:1-t,

said interpolation vector computation step determines as the interpolation vector at said interpolated point the result corresponding to the sum of (1-t) times the interpolation vector at said one vertex plus t times the interpolation vector at said other vertex.

64. The program distribution medium as described in claim 63, wherein

said computer program further includes a correction step that corrects the interpolation

vector at said interpolated point determined by said interpolation vector computation step.

65. The program distribution medium as described in claim 64, wherein

said correction step

determines a vector product of the interpolation vector at said interpolated point determined by said interpolation vector computation step and a tangent-direction tangent vector of said interpolated line at said interpolated point,

determines the vector product of said vector product and said tangent vector, and

takes the resulting vector as a post-correction interpolation vector at said interpolated point.

66. The program distribution medium as described in claim 65, wherein

said image is a three-dimensional image, and

said program further includes a rendering step that renders said sub-unit graphic forms.

67. The program distribution medium as described in claim 66, wherein

said rendering step performs shading based on said post-correction interpolation vector.

68. The program distribution medium as described in claim 49, wherein

said interpolated line is a Bezier curve.

69. The program distribution medium as described in claim 68, wherein

said image is a three-dimensional image; and

said interpolated line computation step includes:

an angle computation step that determines angle 1 or 2 formed by a straight line that joins one vertex and another vertex interpolated by said interpolated line, which is said Bezier curve, and each projection of the straight line onto a plane perpendicular to the interpolation vector at said one vertex or other vertex, which is a plane that includes said one vertex or other vertex,

a distance computation step that determines, based on said angles 1 and 2, a control edge length 1 or 2, which is the distance from said one vertex or other vertex to control point 1 or 2 of said Bezier curve, and

a Bezier curve computation step that determines said Bezier curve as the interpolated line

that interpolates the space between said one vertex and other vertex by determining, based on said control edge length 1 or 2, each said control point 1 and 2.

70. The program distribution medium as described in claim 49, wherein

if the coordinates of the vertices of said unit graphic forms and the interpolation vectors are recorded on a recording medium,

said computer program further includes a playback step which plays back from the recording medium the coordinates of said vertices and the interpolation vectors.

71. The program distribution medium as described in claim 49, wherein

if the coordinates of the vertices of said unit graphic forms and the interpolation vectors are transmitted via a transmission route,

said computer program further includes a reception step that receives the coordinates of said vertices and the interpolation vectors transmitted via the transmission route.

72. The program distribution medium as described in claim 49, wherein

said image is a three-dimensional image,

said computer has an operation means which is operated when a prescribed input is given, and

said computer program further includes:

a geometry processing step that reads data concerning said unit graphic forms from a recording medium and with respect to the data performs geometry processing that corresponds to an input

from said operation means,

a conversion step that converts said sub-unit graphic forms obtained by splitting said unit graphic forms resulting after said geometry processing into ones in the coordinate system of a two-dimensional output device, and

a rendering step that renders said sub-unit graphic forms converted by said conversion step.

73. The program distribution medium as described in claim 49, which

also provides the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

74. An image processing device for processing an image defined by a combination of unit graphic forms, comprising:

an operation means which is operated when said unit graphic forms are input thereto,

an interpolation vector generation means for generating interpolation vectors used for determining an interpolated line that is the line that interpolates a space between a given vertex and another vertex in vertices of said unit graphic forms input by said operation means when said operation means are operated, and

a provision means for providing coordinates of the vertices of said unit graphic forms and the interpolation vectors.

75. The image processing device as described in claim 74, wherein

said provision means provides by recording on a recording medium the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

76. The image processing device as described in claim 74, wherein

said provision means provides by transmitting via a transmission route the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

77. The image processing device as described in claim 74, wherein

said interpolation vector generation means generates as said interpolation vectors, normal-direction normal vectors of the shape to be produced by said unit graphic forms.

78. The image processing device as described in claim 77, wherein

said interpolation vector generation means also generates as said interpolation vectors, in addition to said normal vectors, vectors which define directions of said interpolated lines at said vertices.

79. The image processing device as described in claim 74, wherein

said interpolation vector generation means generates as said interpolation vectors interpolated line direction vectors which define the direction of said interpolated lines at said

vertices.

80. The image processing device as described in claim 79, wherein

if, in a prescribed plane that includes said vertices, said interpolated line is touched by a line onto which is projected a line segment that joins a given vertex and another vertex, said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

81. The image processing device as described in claim 79, wherein

said interpolated line direction vectors are vectors which define a tangent direction of said interpolated lines at said vertices.

82. The image processing device as described in claim 74, and further comprising:

a splitting means for splitting said unit graphic forms into multiple sub-unit graphic forms based on the coordinates of said vertices and the interpolation vectors; and

a rendering means for rendering said sub-unit graphic forms.

83. The image processing device as described in claim 82, wherein

said splitting means includes:

an interpolated line computation means for determining said interpolated lines based on the coordinates of said vertices and said interpolation vectors, and

an interpolated point computation means for determining, as the vertices of said sub-unit graphic forms, interpolated points that are points on said interpolated line.

84. The image processing device as described in claim 83, wherein

said splitting means further includes an interpolation vector computation means for determining from the interpolation vectors at said vertices, interpolation vectors used for determining a line that interpolates the space between a given interpolated point and another interpolated point in said interpolated points.

85. The image processing device as described in claim 84, wherein

when a ratio of the values corresponding to a distance from said interpolated point between one vertex and another vertex to said one vertex or to the other vertex, respectively, is denoted by t:1-t,

said interpolation vector computation means determines as the interpolation vector at said interpolated point the result corresponding to the sum of (1-t) times the interpolation vector at said one vertex plus t times the interpolation vector at said other vertex.

86. The image processing device as described in claim 85, wherein

said splitting means further includes a correction means for correcting the interpolation vector at said interpolated point determined by said interpolation vector computation means.

87. The image processing device as described in claim 86, wherein

said correction means

determines a vector product of the interpolation vector at said interpolated point determined by said interpolation vector computation means and a tangent-direction tangent vector of said interpolated line at said interpolated point,

determines the vector product of said vector product and said tangent vector, and

takes the resulting vector as a post-correction interpolation vector at said interpolated point.

88. The image processing device as described in claim 87, wherein

said rendering means performs shading based on said post-correction interpolation vector.

89. The image processing device as described in claim 83, wherein

said interpolated line is a Bezier curve.

90. The image processing device as described in claim 89, wherein

said image is a three-dimensional image, and

said interpolated line computation means includes:

an angle computation means that determines an angle 1 or 2 formed by a straight line that joins one vertex and another vertex interpolated by said interpolated line, which is said Bezier curve, and each projection of the straight line onto a plane perpendicular to the interpolation vector at said one vertex or other vertex, which is a plane that includes said one vertex or other vertex,

a distance computation means that determines, based on said angles 1 and 2, a control

edge length 1 or 2, which is the distance from said one vertex or other vertex to control point 1 or 2 of said Bezier curve, and

a Bezier curve computation means that determines said Bezier curve as the interpolated line that interpolates the space between said one vertex and other vertex by determining, based on said control edge length 1 or 2, each said control point 1 and 2.

91. An image processing method for an image processing device that processes an image defined by a combination of unit graphic forms, said image processing device including an operation means which is operated when said unit graphic forms are input, the image processing method comprising:

an interpolation vector generation step of generating interpolation vectors used for determining an interpolated line which is the line that interpolates a space between a given vertex and another vertex in vertices of said unit graphic forms input by said operation means when said operation means is operated; and

a provision step of providing coordinates of the vertices of said unit graphic forms and the interpolation vectors.

92. The image processing method as described in claim 91, wherein

said provision step provides by recording on a recording medium the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

93 The image processing method as described in claim 91, wherein

said provision step provides by transmitting via a transmission route the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

94. The image processing method as described in claim 91, wherein

said interpolation vector generation step generates as said interpolation vectors normal-direction normal vectors of the shape to be produced by said unit graphic forms.

95. The image processing method as described in claim 94, wherein

said interpolation vector generation step further generates as said interpolation vectors, in addition to said normal vectors, vectors which define the direction of said interpolated lines at

said vertices.

96. The image processing method as described in claim 91, wherein

said interpolation vector generation step generates as said interpolation vectors interpolated line direction vectors which define the direction of said interpolated lines at said vertices.

97. The image processing method as described in claim 96, wherein

if, in a prescribed plane that includes said vertices, said interpolated line is touched by a line onto which is projected a line segment that joins a given vertex and another vertex, then said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

98. The image processing method as described in claim 96, wherein

said interpolated line direction vectors are vectors that express the tangent direction of said interpolated lines at said vertices.

99. The image processing method as described in claim 96, and further comprising:

a splitting step of splitting said unit graphic forms into multiple sub-unit graphic forms based on the coordinates of said vertices and the interpolation vectors, and

a rendering step of rendering said sub-unit graphic forms.

100. The image processing method as described in claim 99, wherein

said splitting step includes:

an interpolated line computation step of determining said interpolated lines based on the coordinates of said vertices and said interpolation vectors, and

an interpolated point computation step of determining, as the vertices of said sub-unit graphic forms, interpolated points that are points on said interpolated line.

101. The image processing method as described in claim 100, wherein

said splitting step further includes an interpolation vector computation step of determining, from the interpolation vectors at said vertices, interpolation vectors used for determining a line that interpolates a space between a given interpolated point and another interpolated point in said interpolated points.

102. The image processing method as described in claim 101, wherein

when a ratio of the values corresponding to a distance from said interpolated point between one vertex and another vertex to said one vertex or to the other vertex, respectively, is denoted by T:1-T,

said interpolation vector computation step determines as the interpolation vector at said interpolated point the result corresponding to the sum of (1-T) times the interpolation vector at said one vertex plus T times the interpolation vector at said other vertex.

103. The image processing method as described in claim 102, wherein

said splitting step further includes a correction step of correcting the interpolation vector at said interpolated point determined by said interpolation vector computation step.

104. The image processing method as described in claim 103, wherein

said correction step

determines a vector product of the interpolation vector at said interpolated point determined by said interpolation vector computation step and a tangent-direction tangent vector of said interpolated line at said interpolated point,

determines the vector product of said vector product and said tangent vector, and

takes the resulting vector as the post-correction interpolation vector at said interpolated point.

105. The image processing method as described in claim 104, wherein

said rendering step performs shading based on said post-correction interpolation vector.

106. The image processing method as described in claim 100, wherein

said interpolated line is a Bezier curve.

107. The image processing method as described in claim 106, wherein

said image is a three-dimensional image, and

said interpolated line computation step has

an angle computation step that determines angle 1 or 2 formed by the straight line that joins one vertex and another vertex interpolated by said interpolated line, which is said Bezier

curve, and each projection of the straight line onto a plane perpendicular to the interpolation vector at said one vertex or other vertex, which is a plane that includes said one vertex or other vertex,

a distance computation step that determines, based on said angles 1 and 2, a control edge length 1 or 2, which is the distance from said one vertex or other vertex to control point 1 or 2 of said Bezier curve, and

a Bezier curve computation step that determines said Bezier curve as the interpolated line that interpolates the space between said one vertex and other vertex by determining, based on said control edge length 1 or 2, each said control point 1 or 2.

108. A program distribution medium which provides a computer program to cause a computer to process an image defined by a combination of unit graphic forms,

said computer including an operation means which is operated when unit graphic forms are input thereto, and

the computer program provided by the program distribution medium comprising

an interpolation vector generation step which generates interpolation vectors used for determining an interpolated line that is the line that interpolates a space between a given vertex and another vertex in vertices of said unit graphic forms input by said operation means when said operation means is operated, and

a provision step of providing coordinates of the vertices of said unit graphic forms and the interpolation vectors.

109. The program distribution medium as described in claim 108, wherein

said provision step provides by recording on a recording medium the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

110. The program distribution medium as described in claim 108, wherein

said provision step provides by transmitting via a transmission route the coordinates of the vertices of said unit graphic forms and the interpolation vectors.

111. The program distribution medium as described in claim 108, wherein

said interpolation vector generation step generates as said interpolation vectors, normal-direction normal vectors of a shape to be produced by said unit graphic forms.

112. The program distribution medium as described in claim 111, wherein

said interpolation vector generation step further generates as said interpolation vectors, in addition to said normal vectors, vectors which define the direction of said interpolated lines at said vertices.

113. The program distribution medium as described in claim 108, wherein

said interpolation vector generation step generates as said interpolation vectors interpolated line direction vectors which define directions of said interpolated lines at said vertices.

114. The program distribution medium as described in claim 113, wherein

if, in a prescribed plane that includes said vertices, said interpolated line is touched by a line onto which is projected a line segment that joins a given vertex and another vertex, said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

115. The program distribution medium as described in claim 113, wherein

said interpolated line direction vectors are vectors which define a tangent direction of said interpolated lines at said vertices.

116. The program distribution medium as described in claim 108, wherein

said computer program further comprises

a splitting step that splits said unit graphic forms into multiple sub-unit graphic forms based on the coordinates of said vertices and the interpolation vectors, and

a rendering step that renders said sub-unit graphic forms.

117. The program distribution medium as described in claim 116, wherein

said splitting step includes

an interpolated line computation step which determines said interpolated lines based on the coordinates of said vertices and said interpolation vectors, and

an interpolated point computation step that determines, as the vertices of said sub-unit

graphic forms, interpolated points that are points on said interpolated line.

118. The program distribution medium as described in claim 117, wherein

said splitting step further includes an interpolation vector computation step that determines, from the interpolation vectors at said vertices, interpolation vectors used for determining a line that interpolates a space between a given interpolated point and another interpolated point in said interpolated points.

119. The program distribution medium as described in claim 118, wherein

when a ratio of the values corresponding to a distance from said interpolated point between one vertex and another vertex to said one vertex or to the other vertex, respectively, is denoted by t:1-t,

said interpolation vector computation step determines as the interpolation vector at said interpolated point the result corresponding to the sum of (1-t) times the interpolation vector at said one vertex plus t times the interpolation vector at said other vertex.

120. The program distribution medium as described in claim 119, wherein

said splitting step further includes a correction step that corrects the interpolation vector at said interpolated point determined by said interpolation vector computation step.

121. The program distribution medium as described in claim 120, wherein

said correction step

determines a vector product of the interpolation vector at said interpolated point determined by said interpolation vector computation step and a tangent-direction tangent vector of said interpolated line at said interpolated point,

determines the vector product of said vector product and said tangent vector, and

takes the resulting vector as the post-correction interpolation vector at said interpolated point.

122. The program distribution medium as described in claim 121, wherein

said rendering step performs shading based on said post-correction interpolation vector.

123. The program distribution medium as described in claim 117, wherein

said interpolated line is a Bezier curve.

124. The program distribution medium as described in claim 123, wherein

said image is a three-dimensional image, and

said interpolated line computation step includes:

an angle computation step that determines an angle 1 or 2 formed by a straight line that joins one vertex and another vertex interpolated by said interpolated line, which is said Bezier curve, and each projection of the straight line onto a plane perpendicular to the interpolation vector at said one vertex or other vertex, which is a plane that includes said one vertex or other vertex,

a distance computation step that determines, based on said angles 1 and 2, a control edge length 1 or 2, which is the distance from said one vertex or other vertex to control point 1 or 2 of said Bezier curve, and

a Bezier curve computation step that determines said Bezier curve as the interpolated line that interpolates the space between said one vertex and other vertex by determining, based on said control edge length 1 or 2, each said control point 1 and 2.

125. A data distribution medium that provides data concerning images defined by a combination of unit graphic forms, wherein

if a unit graphic form is input, then by generating interpolation vectors used for determining an interpolated line that is the line that interpolates a space between a given vertex and another vertex in vertices of the unit graphic form,

it provides as data concerning said image, at least interpolation vectors at said vertices and coordinates of said vertices thus obtained.

126. The data distribution medium as described in claim 125, wherein

said interpolation vectors are normal-direction normal vectors of the shape to be produced by said unit graphic forms.

127. The data distribution medium as described in claim 126, wherein

said interpolation vectors further include, in addition to said normal vectors, vectors

which define a direction of said interpolated lines at said vertices.

128. The data distribution medium as described in claim 125, wherein

said interpolation vectors are interpolated line direction vectors which define the direction of said interpolated lines at said vertices.

129. The data distribution medium as described in claim 128, wherein

if, in a prescribed plane that includes said vertices, said interpolated line is touched by a line onto which is projected a line segment that joins a given vertex and another vertex, said interpolated line direction vectors are normal-direction vectors in said prescribed plane.

130. The data distribution medium as described in claim 128, wherein

said interpolated line direction vectors are vectors which define a tangent direction of said interpolated lines at said vertices.

131. The data distribution medium as described in claim 125, wherein

said interpolated line is a Bezier curve.

132. The data distribution medium as described in claim 125, wherein

said image is a three-dimensional image.

133. An image processing device for processing images defined by a combination of unit graphic forms, comprising:

a provision device for providing data concerning an image, and

a client device for receiving a provision of the data from said provision device and splitting unit graphic forms defining the image into multiple sub-unit graphic forms;

said provision device including:

an operation means which is operated when said unit graphic forms are input,

an interpolation vector generation means for generating interpolation vectors used for determining an interpolated line that is the line that interpolates a space between a given vertex and another vertex in vertices of said unit graphic forms input by said operation means when said operation means is operated, and

a provision means for providing to said client device coordinates of the vertices of said

unit graphic forms and the interpolation vectors; and

said client device including:

an interpolated line computation means for determining said interpolated lines from the coordinates of the vertices of said unit graphic forms and from said interpolation vectors,

an interpolated point computation means for determining, as the vertices of said sub-unit graphic forms, interpolated points that are points on said interpolated lines,

a conversion means for converting said sub-unit graphic forms into ones in a coordinate system of a two-dimensional output device, and

a rendering means for rendering said sub-unit graphic forms converted by said conversion means.